

Amendments to the Claims:

This listing of claims shows all amendments having been made since the filing of the present reissue application.

Listing of Claims:

1. (Thrice Amended) A method for filling contact holes with metal by two-step deposition of metal layers, said method comprising the steps of:
 - providing a [silicon] substrate;
 - forming an [a field] oxide layer, [and] a junction layer and gate electrode on said silicon substrate;
 - forming a first insulating layer on exposed portions of the [field] oxide layer, the junction layer, and the gate electrode;
 - forming a first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said junction layer and said gate electrode, respectively the first plurality of contact holes having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;
 - filling a first metal layer into the first plurality of contact holes, entirely, the first metal layer being grown over and extending slightly beyond said first plurality of contact holes[holes];
 - forming a conductive layer pattern on the first insulating layer spaced from said first metal layer;
 - forming a second insulating layer on exposed portions of the conductive layer pattern, the first insulating layer, and the first plurality of contact holes;
 - forming a second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the conductive layer pattern, respectively; and
 - filling a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

2. (Pending) A method according to claim 1, wherein the first metal layer and subsequently the second metal layer are formed by chemical vapor deposition method.

3. (Pending) A method according to claim 1, wherein the filling a second metal layer fills the second plurality of contact holes to a substantially equal depth [second metal layer filled in each of the second plurality of contacts holes has substantially equal depth].

4. (Pending) A method according to claim 1, wherein the first and second metal layers are selective tungsten layers, respectively, and the first and second plurality of contact holes are filled with the first and second metal layers of the selected tungsten layers, respectively.

Cancel claims 5.-28.

29. (Canceled)

30. (Thrice amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer and a junction layer on said substrate;

forming a first insulating layer on exposed portions of the oxide layer and the junction layer;

forming first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said junction layer, the first plurality of contact holes having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

forming a first metal layer into the first plurality of contact holes, entirely;

forming a conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the conductive layer pattern, the first insulating layer, and the first plurality of contact holes;

forming second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the conductive layer pattern, respectively; and

forming a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

31. (Thrice amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer and a gate electrode on said substrate;

forming a first insulating layer on exposed portions of the oxide layer and the gate electrode;

forming first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said gate electrode, the first plurality of contact holes having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

filling a first metal layer into the first plurality of contact holes, entirely;

forming a conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the conductive layer pattern, the first insulating layer, and the first plurality of contact holes;

forming second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the conductive layer pattern, respectively; and

filling a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

32. (Thrice amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer and a first conductive layer pattern on said substrate;

forming a first insulating layer on exposed portions of the oxide layer and the first conductive layer pattern, wherein a thickness of the first insulating layer is substantially uniform;

forming a first contact hole by removing a portion of the first insulating layer to expose said first conductive layer pattern, the first contact hole having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

forming a first metal layer into the first plurality of contact hole, entirely;

forming a second conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the second conductive layer pattern, the first insulating layer, and the first contact hole;

forming second and third contact holes of substantially equal depth by removing portions of said second insulating layer to expose the first metal layer and the second conductive layer pattern, respectively; and

forming a second metal layer into said second and third contact holes to contact the first metal layer and the second conductive layer pattern, respectively.

33. (Pending) A method as in claim 32, wherein said first conductive layer pattern comprises a gate electrode.

34. (Thrice amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer, a junction layer and a first conductive layer pattern on said substrate;

forming a first insulating layer on exposed portions of the oxide layer, the junction layer, and the first conductive layer pattern;

forming first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said junction layer and said first conductive layer pattern, respectively, the first plurality of contact holes having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

forming a first metal layer into the first plurality of contact holes, entirely;

forming a second conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the second conductive layer pattern, the first insulating layer, and the first plurality of contact holes;

forming second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the second conductive layer pattern, respectively; and

forming a second metal layer into said second plurality of contact holes to contact the first metal layer and the second conductive layer pattern, respectively.

35. (Pending) A method as in claim 34, wherein said first conductive layer pattern comprises a gate electrode.

36. (Thrice amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer, and first and second regions on said substrate;

forming a first insulating layer on exposed portions of the oxide layer, the first region and the second region;

forming first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said first and said second regions, respectively, the

first plurality of contact holes having a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

forming a first metal layer into the first plurality of contact holes, to fill said first plurality of contact holes entirely;

forming a conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the conductive layer pattern, the first insulating layer, and the first plurality of contact holes;

forming second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the conductive layer pattern, respectively; and

forming a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

37. (Pending) A method as in claim 36, wherein said first region comprises a junction layer.

38. (Pending) A method as in claim 36, wherein said second region comprises a gate electrode.

39. (Four times amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of metal layers, said method comprising:

providing a substrate;

forming an oxide layer, a junction layer and a gate electrode on said substrate;

forming a first insulating layer on exposed portions of the oxide layer, the junction layer, and the gate electrode;

forming first plurality of contact holes of substantially equal depth by removing portions of the first insulating layer to expose said junction layer and said gate electrode,

respectively, wherein said first plurality of contact holes have a tapered upper portion, wherein a taper angle of the tapered upper portion deviates from a taper angle of a lower portion;

forming a first metal layer into the first plurality of contact holes, to fill said first plurality of contact holes entirely;

forming a conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the conductive layer pattern, the first insulating layer, and the first plurality of contact holes;

forming second plurality of contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the conductive layer pattern, respectively; and

forming a second metal layer into said second plurality of contact holes to contact the first metal layer and the conductive layer pattern, respectively.

40. (Canceled)

41. (Four times amended) A method of forming a semiconductor with contact holes filled by multi-step deposition of conductive material layers, said method comprising:

providing a substrate;

forming an oxide layer and a first conductive layer pattern on said substrate;

forming a first insulating layer on exposed portions of the oxide layer and the first conductive layer pattern, wherein a thickness of the first insulating layer is substantially uniform;

forming a first contact hole by removing portions of the first insulating layer to expose said first conductive layer pattern, wherein said first contact hole has an upper portion width and a lower portion width, said upper portion width greater than said lower portion width;

forming a first metal layer into the first contact hole, entirely;

forming a second conductive layer pattern on the first insulating layer spaced from said first metal layer;

forming a second insulating layer on exposed portions of the second conductive layer pattern, the first insulating layer, and the first contact hole;

forming second and third contact holes of substantially equal depth by removing portions of said second insulating layer to expose both the first metal layer and the second conductive layer pattern, respectively; and

forming a second metal layer into said second and third contact holes to contact the first metal layer and the second conductive layer pattern, respectively.

42. (Once amended) The method as in claim 41, wherein said first metal layer comprises tungsten.

Cancel claim 43.

44. (Canceled)

45. (Pending) The method of claim 41, wherein said first conductive layer pattern comprises a gate electrode.

46. (Pending) The method of claim 41, wherein said first conductive layer pattern comprises a gate electrode overlying a gate oxide.

47. (Pending) The method of claim 41, wherein said forming an oxide layer and a first conductive layer pattern further comprises forming a junction layer.

48. (Once amended) The method of claim 47, wherein said junction layer comprises a N+ junction layer.

49. (Once amended) The method of claim 47, wherein said junction layer comprises a P+ junction layer.

50. (Pending) The method of claim 41, wherein said first conductive layer pattern comprises polysilicon.

51. (Pending) The method of claim 41, wherein said first insulating layer comprises a first oxide layer.

52. (Pending) The method of claim 41, wherein said step of forming said first contact hole comprises a photoresist process.

53. (Pending) The method of claim 41, wherein said step of forming said first contact hole comprises a wet etch process.

54. (Pending) The method of claim 41, wherein said step of forming said first contact hole comprises a dry etch process.

55. (Pending) The method of claim 47, wherein said step of forming said first contact hole further exposes said junction layer.

56. (Pending) The method of claim 41, wherein said first contact hole has a tapered upper portion.

57. (Once amended) The method of claim 41, wherein said step of forming said first metal layer comprises a CVD process.

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59. (Pending) The method of claim 41, wherein said second insulating layer comprises a second oxide layer.

60. (Pending) The method of claim 41, wherein said step of forming said second and third contact holes comprises a photoresist process.

61. (Pending) The method of claim 41, wherein said step of forming said second and third contact holes comprises a wet etch process.

62. (Pending) The method of claim 41, wherein said step of forming said second and third contact holes comprises a dry etch process.

63. (Once amended) The method of claim 41, wherein said step of forming said second metal layer comprises a CVD process.

Cancel claims 64.-70.

71. (Canceled)

Cancel claims 72.-80.

81. (Canceled)

Cancel claims 82.-88.